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Prevention and Assessment and Management of Diabetic Patients during the COVID-19 Pandemic: A Review

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Abstract

COVID-19 has become a great challenge across the globe, particularly in developing and densely populated countries, such as India. COVID-19 is extremely infectious and is transmitted via respiratory droplets from infected persons. DM, hypertension, and cardiovascular disease are highly prevalent comorbidities associated with COVID-19. It has been observed that COVID-19 is associated with high blood-glucose levels, mainly in people with type 2 diabetes mellitus (T2DM). Several studies have shown DM to be a significant risk factor affecting the severity of various kinds of infection. Dysregulated immunoresponse found in diabetic patients plays an important role in exacerbating severity. The coronavirus disease 2019 (COVID-19) pandemic has emerged as one of the greatest challenges faced by humankind in the recent past. People with diabetes and related comorbidities are at increased risk of its complications and of COVID-19-related death. Older age, multi-morbidity, hyperglycaemia, cardiac injury and severe inflammatory response are predictors of poor outcome. The complex interplay between COVID-19, diabetes and the effects of related therapies is being explored. Most patients experience a mild illness with COVID-19, while people with diabetes are at increased risk of severe disease. Optimising glycaemic control and adopting measures to prevent disease spread are critical aspects. The management of mild disease is supportive, while very many immunomodulatory and antiviral therapies are being investigated for the treatment of severe disease. Several of these agents have specific considerations for use in people with diabetes. Since mass population lockdowns are considered a key step in controlling disease spread, it follows that, in addition to the direct vulnerability to severe COVID-19, people with diabetes can be affected by limited access to healthcare, insulin, other medications and blood glucose monitoring equipment. Measures to prevent disease spread at the individual and community level are the key to mitigating the rapidly escalating pandemic, while agents for chemoprophylaxis and vaccines are being explored.

Keywords: COVID-19; Diabetes; Hypertension; Cardiovascular diseases

Introduction

Several studies have also reported that immunocompromised COVID-19 patients, including those with HIV, pregnant women, and cancer patients, could be at higher risk of severe COVID-19 symptoms. Nations with high HIV-infection rates, such as India and South Africa, tend to have more COVID-19 patients. That COVID-19 infection in pregnant patients requires extra management with special care. The UK National Health Service found that some groups, including blood cancer patients and those undergoing radio- or chemotherapy for lung cancer, were particularly susceptible to severe COVID-19 infection.

At the time of writing, COVID-19 cases are increasing day by day with >91 million confirmed cases, 1,986,871 deaths worldwide,13 and >10.5 million confirmed cases with 151,918 deaths in India In 2019, around 77 million were living with DM in India[1], and this number will increase to 101 million by 2030 and 134.2 million by 2045. After China, India has the second-highest number of diabetic patients across the globe.15 In India, about 12.1 million people aged ≥65 years had DM in 2019.

Diabetes and infections

Both type 1 and type 2 diabetes increases the susceptibility to infections and their complications [2]. Neutrophil dysfunction, reduced T cell response and disordered humoral immunity are contributory [3], and bacterial and viral respiratory tract infections are particularly common [4]. Diabetes is associated with increased morbidity and mortality risk from pneumonia [5], and hyperglycaemia on admission for pneumonia (>11 mmol/l) predicts poor outcome. During the SARS epidemic in 2002/2003, diabetes was an independent predictor of mortality risk (OR 3.0; 95% CI 1.4, 6.3; p = 0.005) [6]. The presence of comorbidities, including diabetes, also increased mortality risk

(independent of age) during the Middle East respiratory syndrome-coronavirus (MERS-CoV) epidemic in 2012 (adjusted HR 3.74; 95% CI 2.57, 5.67). In another study, diabetes had the strongest impact on mortality risk among MERS-CoV patients. Similarly, among young patients with novel influenza A (H1N1) in 2009, diabetes increased the risk of intensive care unit (ICU) admissions (adjusted OR 4.72; 95% CI 1.81, 12.3)

COVID-19 Characteristics

Incubation Time

The period between infectivity and onset of disease is known as incubation time. A study involving 1,099 people infected with COVID-19 reported that average incubation time for symptomatic SARS-CoV2 was 4 days. Another study on 181 COVID-19 patients from China confirmed an average incubation time of 5 days for SARS-CoV2, and in 97.5% of patients, symptoms of infection developed within 12 days. On the basis of the incubation time of SARS-CoV and MERS-CoV, the US Centers for Disease Control and Prevention (CDC) projected that COVID-19 symptoms would arise2–14 after infection

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[7]. As such, 14 days (quarantine) is the period used for examining and limiting the movement of individuals at risk.

Modes of Transmission

Most of the original people infected with COVID-19 had a history of direct contact with a wholesale market for wildlife and seafood in China, signifying the exposure of zoonotic virus as a major transmission mode of COVID-19. Analysis of virus-sequencing data revealed that COVID-19found in bats and SARS-CoV2 may have a common ancestor, though this Chinese wholesale market does not sell bats [8]. After some time, COVID-19 infections were found in health-care personnel and other individuals with no contact with wildlife or travel history in Wuhan, China, indicating individual-to-individual transmission or spread of COVID-19.30 Numerous studies have suggested that SARS-CoV2 could be transmitted via aerosols, drops, and direct contact with infected persons (Figure 1). Respiratory drops spread infection from one individual to another through sneezing and coughing. This happens because respiratory drops from an infected individual get into the air and are inhaled by healthy individuals nearby (within 2 m). Individuals can get COVID-19 infection via contacting contaminated objects or surfaces infected with COVID-19 and then touching their eyes, mouth, or nose. Studies have revealed that COVID-19 can stay viable within aerosols for up to 3 hours and spread in a closed system if inhaled breathed into the respiratory tract. As such, transmission of COVID-19 through the air has been made possible due to aerosol-producing processes like cardiopulmonary resuscitation, bronchoscopy, tracheostomy, endotracheal intubation, and non-invasive positive-pressure ventilation.

Patients with Diabetes at Risk of Covid-19

The COVID-19 pandemic is far from being solely a medical phenomenon. It disrupts personal and professional lives severely and affects people and societies on several levels. The key strategies promoted for containment of an outbreak such as isolation, social distancing and lockdown of cities can have a significant impact on the health and lifestyle of an individual. Management of a chronic disease such as diabetes, which requires dietary modification, regular exercise and good adherence to medications, poses many complex challenges.

Maintaining a healthy diet may be challenging because of limited access to appropriate food. Careful portion selection and adjusting mealtime insulin according to carbohydrate intake continues to be the best strategy, particularly for patients on multiple-dose insulin regimens.

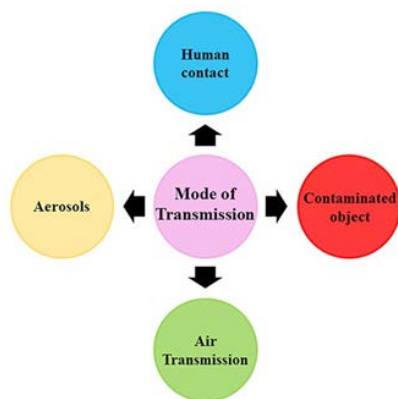Adopting a regular exercise plan might not be feasible owing to

Figure 1: Mode of transmission of novel COVID-19.

social distancing, restrictions on outdoor activities and concerns over the high risk of disease spread in gyms and sports centres (many of which are closed during lockdown, depending on regional restrictions) [9]. Activities such as indoor walking, gardening and stationary high intensity activities may be suitable alternatives to maintain an active lifestyle.

Regular monitoring of blood glucose is important. Continuous glucose monitoring (CGM) and flash glucose monitoring systems are useful and allow remote monitoring by healthcare providers (however see below under 'Management of patients with diabetes and COVID-19' for possible concerns regarding the use of paracetamol/acetaminophen alongside CGM). For patients with type 1 diabetes, monitoring of ketone levels (particularly for people who are persistently hyperglycaemic) and vigilance for the development of symptoms of DKA are important.

It is also important that people with diabetes have an adequate supply of their medications at home. In fact, increased incidence of DKA among children with type 1 diabetes has been observed due to a delay in seeking medical treatment and in providing routine healthcare for newly developed symptoms, as patients are afraid of contracting COVID-19 from healthcare settings [10].

Routine clinic visits and overcrowding in hospitals should be minimised to reduce disease spread among people with diabetes. Measures such as telemedicine consultations or telephone advice, issue of medication to caregivers at lower risk, online coordination of drug delivery, and dispensing medications for extended periods should be considered by healthcare providers. Non-emergency routine evaluations (for foot disease, retinopathy etc.) should be deferred, as close contact between the healthcare providers and patients may lead to increased risk of COVID-19 transmission. Patients with limb-threatening or vision-threatening complications should be triaged for immediate attention.

During this time of uncertainty, fear, helplessness and strong emotions may increase stress in some patients. It is important to ensure psychological wellbeing, as stress may adversely affect glycaemic control. The WHO recommends minimising reading or listening to news that could cause distress and anxiety. Regular sleep routines are important. Relaxation techniques such as meditation can help people with stress and anxiety. Maintaining contact with relatives, friends and neighbours via telephone conversations or using online communication platforms can help to reduce the effects of social isolation

Conclusion

SARS-CoV2 is extremely infectious and transmitted via respiratory droplets from infected persons. Severe cases of COVID-19 have been observed in people with comorbidities, particularly CVD, hypertension, and DM. An increasing number of studies have shown DM to be a vital risk factor affecting the severity of various other kinds of infection. Dysregulated immunoresponse found in diabetic patients plays an important role in exacerbating severity. DM is among the comorbidities linked to mortality and morbidity due to COVID-19. Chronic conditions like obesity, CVD, and hypertension together with changed expression of ACE2, Dysregulated immunoresponse, and endothelial dysfunction may put diabetic patients at greater risk of COVID-19 infection. The awareness and opinions of people are likely to impact the great amount of protection methods and eventually affect the results of clinical research. Therefore, it is important to study specific characteristics of COVID-19 in diabetic people and treat comorbidities along with COVID-19 infection, mainly among old individuals who are already suffering from serious and critical infections.

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Disclosure

The authors declare that they have no conflicts of interest associated with this work.

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